

भारतीय मानक  
प्राकृतिक निर्माण-पत्थरों का टिकाउपन  
ज्ञात करना — परीक्षण पद्धति  
(दूसरा पुनरीक्षण)

*Indian Standard*  
**DETERMINATION OF DURABILITY OF NATURAL  
BUILDING STONES — METHOD OF TEST**  
( *Second Revision* )

ICS 91.100.15

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**BUREAU OF INDIAN STANDARDS**  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

## FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Stones Sectional Committee had been approved by the Civil Engineering Division Council.

Building stones are available in large quantity in various parts of the country and to choose and utilize them for their satisfactory performance, it is necessary to know the various properties determined according to standard procedure. This standard has, therefore, been formulated to cover the standard method for determining the durability (soundness) of various stones. The method of test prescribed in this standard determines the capacity of stone to resist disintegration and decomposition.

This standard was first published in 1957 and revised in 1974 based on its actual use and the further experience gained in testing of building stones for this property in the various research laboratories in the country.

This second revision has been brought out to incorporate the further experience gained based on the use of the standard since its last revision. The major modifications incorporated in the revision are as follows:

- a) SI units have been used.
- b) Size of the samples has been specified as stones of adequate size in place of the requirement of at least 25 kg specified earlier.
- c) Dimension of specimen has been modified thereby specifying the same to be not less than 50 mm or 10 times the largest size of mineral grain present in the stone, whichever is greater.
- d) The minimum number of test specimen has been revised from 3 to 5 for test for each of the set of conditions. Provision of an additional specimen as reference specimen has been included.
- e) Conditioning requirements of the test specimens have been modified thereby specifying drying at  $70 \pm 5$  °C for 6 h in place of  $105 \pm 5$  °C for 4 h specified earlier.
- f) Requirement of visual examination of the test specimen after carrying out the durability test has been included.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated expressing the results of a test or analysis, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

## *Indian Standard*

# DETERMINATION OF DURABILITY OF NATURAL BUILDING STONES — METHOD OF TEST

## ( *Second Revision* )

### 1 SCOPE

This standard lays down the procedure for testing the durability (soundness) of natural building stones used for constructional purposes.

### 2 REFERENCE

The standard listed below contains provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below:

<i>IS No.</i>	<i>Title</i>
1121 (Part 2) : 2013	Methods of test for determination of strength properties of natural building stones: Part 2 Transverse strength ( <i>second revision</i> )

### 3 SELECTION OF SAMPLES

**3.1** The sample shall be selected to represent a true average of the type or grade of stone under consideration.

**3.2** The sample shall be selected from the quarried stone or taken from the natural rock, as described in **3.2.1** and **3.2.2** and shall be of adequate size to permit the preparation of the requisite number of test specimens.

#### **3.2.1** *Stones from Ledges or Quarries*

The ledge or quarry face of the stone shall be inspected to determine any variation in different strata. Differences in colour, texture and structure shall be observed. Separate samples of stone of adequate size of the unweathered specimens shall be obtained from all strata that appear to vary in colour, texture and structure. Pieces that have been damaged by blasting, driving wedges, heating, etc, shall not be included in the sample.

#### **3.2.2** *Field Stone and Boulders*

A detailed inspection of the stone and boulders over the area shall be made where the supply is to be obtained. The different kinds of stones and their

conditions at various quarry sites shall be recorded. Separate samples for each class of stone that would be considered for use in construction as indicated by visual inspection shall be selected.

**3.3** When perceptible variations occur in the quality of rock, as many samples as are necessary for determining the range in properties shall be selected.

### 4 TEST SPECIMENS

**4.1** Test specimens shall be made from samples selected in accordance with **3** and shall be in the form of cylinders. They shall be cut or drilled from the samples. The diameter of test specimen shall not be less than 50 mm or 10 times the size of the largest mineral grain present in the rock, whichever is greater and the ratio of height to diameter or lateral dimension shall not be less than 1:1.

NOTE — Test specimens prepared out of broken beams in the transverse test [see IS 1121 (Part 2)] may also be used.

**4.2** Five test specimens shall be used for conducting the test. One additional specimen shall be retained as a reference specimen.

### 5 PROCEDURE

**5.1** The test specimens shall be air dried for 24 h and weighed ( $W_1$ ). They shall then be suspended in super saturated solution of sodium sulphate decahydrate for 16 h to 18 h at room temperature 20°C to 30°C. These shall then be air dried for 30 min and then be dried in an oven at  $70 \pm 5$  °C till constant mass is reached. These shall then be cooled to room temperature (20°C to 30°C) and the cycle of operation shall be repeated for 30 cycles.

**5.2** The test shall be continued to complete 30 cycles. After the completion of the final cycle and after the test specimens have been cooled to room temperature (20°C to 30°C), the test specimens shall be thoroughly freed of the sodium sulphate solution by repeated washing, if necessary, as determined by the reaction of the wash water with barium chloride ( $\text{BaCl}_2$ ). The test specimens shall be weighed after every five cycles and the change in mass due to disintegration noted.

**5.3** The test specimens, after the test, shall be visually examined *vis-à-vis* the reference specimen with regard

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to any change in colour, crack/fracture, spall, texture and deposition.

### 6 EVALUATION AND REPORT OF TEST RESULTS

**6.1** If  $W_1$  is the original mass of the specimen and  $W_2$  is the mass of the specimen after completion of 30 cycles of the test (*see 5.2*), the change in mass shall be

$$= \frac{W_1 - W_2}{W_1} \times 100$$

**6.2** The average of the five results shall be calculated and taken as the durability value of the specimen.

**6.3** The durability of the stone shall be expressed in percentage as change in the mass. The result of visual examination (*see 5.3*) shall also be reported.

**6.4** Identification of the sample, date, when sample was taken and type of stone shall be reported.

**6.5** Size and shape of test specimens used in the tests shall be indicated.

**ANNEX A***(Foreword)***COMMITTEE COMPOSITION****Stones Sectional Committee, CED 6**

<i>Organization</i>	<i>Representative(s)</i>
In personal capacity ( <i>C-3/3188, Vasant Kunj, New Delhi</i> )	DR A. K. DHAWAN ( <b>Chairman</b> )
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Shriram Institute of Industrial Research, Delhi	DR LAXMI RAWAT SHRI R. K. SINGH ( <i>Alternate</i> )

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### BUREAU OF INDIAN STANDARDS

#### Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones : 2323 0131, 2323 3375, 2323 9402

Website: [www.bis.org.in](http://www.bis.org.in)

#### Regional Offices:

#### Telephones

Central	: Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	{ 2323 7617 2323 3841
Eastern	: 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi KOLKATA 700054	{ 2337 8499, 2337 8561 2337 8626, 2337 9120
Northern	: SCO 335-336, Sector 34-A, CHANDIGARH 160022	{ 260 3843 260 9285
Southern	: C.I.T. Campus, IV Cross Road, CHENNAI 600113	{ 2254 1216, 2254 1442 2254 2519, 2254 2315
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